Claims

1. (Currently Amended) A thermoelectric power source comprising:

a flexible substrate having an upper surface; and

a plurality of thermoelectric couples with the thermoelectric couples comprising:

(a) a sputter deposited thin film p-type thermoelement positioned on the upper surface of the flexible substrate;

(b) a sputter deposited thin film n-type thermoelement positioned on the upper surface of the flexible substrate adjacent the p-type thermoelement;

(c) an electrically conductive member positioned on the flexible substrate, and electrically connecting the first end of the p-type thermoelement with the second end of the n-type thermoelement, wherein the p-type or the n-type thermoelements comprise Bi_xTe_y, Sb_xTe_y, or Bi_xSe_y wherein x and y form a non-stoichiometric compound and x is about 2 and y is about 3; and

wherein the thermoelectric couples are formed on a single substrate and the flexible substrate is in a coil configuration or an accordion configuration.

2. (Currently Amended) A~~The~~ thermoelectric power source ~~of claim 1~~ comprising:

a flexible substrate having an upper surface; and

a plurality of thermoelectric couples with the thermoelectric couples comprising:

(a) a sputter deposited thin film p-type thermoelement positioned on the upper surface of the flexible substrate;

(b) a sputter deposited thin film n-type thermoelement positioned on the upper surface of the flexible substrate adjacent the p-type thermoelement;

(c) an electrically conductive member positioned on the flexible substrate, and electrically connecting the first end of the p-type thermoelement with the second end of the n-type thermoelement, wherein the p-type or the n-type thermoelements comprise Bi_xTe_y, Sb_xTe_y, or Bi_xSe_y wherein and x is about 2 and y is about 3;

wherein the thermoelectric couples are formed on a single substrate and the flexible substrate is in a coil configuration or an accordion configuration; and

wherein the p-type or the n-type thermoelements have L/A ratios greater than about 500 ~~20~~ cm^{-1}.

3. (Original) The thermoelectric power source of claim 1 wherein the p-type or the n-type thermoelements have L/A ratios greater than about ~~100~~ 1000 cm^{-1}.

4. (Canceled)

5. (Previously presented) The thermoelectric power source of claim 1 wherein the thermoelectric power source has a power output of at least about 1 μW with a voltage of at least about 0.25 volt.

6. (Previously presented) The thermoelectric power source of claim 1 further comprising at least about 50 thermoelectric couples, wherein the thermoelectric power source has a power output of at least about 1 μW with a voltage of at least about 0.25 volt.

7. (Original) The thermoelectric power source of claim 6 wherein the p-type or the n-type thermoelements are at least about 1 mm in length and at least about 0.1 mm in width.

8. (Original) The thermoelectric power source of claim 6 wherein the p-type or the n-type thermoelements are at least about 20 angstroms in thickness.

9. (Original) The thermoelectric power source of claim 1 further comprising at least about 1000 thermoelectric couples, wherein the thermoelectric power source has a power output of about 1W with a voltage of at least about 1 volt.

10. (Previously presented) The thermoelectric power source of claim 1 wherein the p-type thermoelements each have a first width, the n-type thermoelements each have a second width, and the first width is different from the second width.

11. (Original) The thermoelectric power source of claim 1 wherein two or more p-type thermoelements are positioned and electrically connected in parallel with one another and the

parallel positioned p-type thermoelements are electrically connected in series to n-type thermoelements.

12. (Previously presented) The thermoelectric power source of claim 1 wherein the thin film p-type thermoelement and/or the thin film n-type thermoelement are co-sputter deposited thin films comprising Bi_xTe_y, Sb_xTe_y, or Bi_xSe_y wherein x is about 2 and y is about 3.

13. (Original) The thermoelectric power source of claim 1 wherein the volume of the thermoelectric power source is less than about 10 cm^3 and has a power output of from about 1 μW to about 1 W.

14. (Original) The thermoelectric power source of claim 1 wherein the volume of the thermoelectric power source is less than about 10 cm^3 and provides voltages of greater than about 1 volt.

15. (Original) The thermoelectric power source of claim 14 wherein the thermoelectric power source produces power at temperature differences of about 20°C or less.

16. (Original) The thermoelectric power source of claim 1 wherein two or more n-type thermoelements are positioned and electrically connected in parallel with one another and the parallel positioned n-type thermoelements are electrically connected in series to p-type thermoelements.

17. (Original) The thermoelectric power source of claim 1 wherein the n-type thermoelements are substantially free of selenium.

18. (Original) The thermoelectric power source of claim 1 wherein the flexible substrate is a polyimide.

Claims 19 – 22 (Canceled)

23. (Currently Amended) A thermoelectric power source comprising:

~~a flexible substrate having an upper surface;~~

multiple thermocouples electrically connected to one another on ~~the~~ an upper surface of a single flexible substrate, the thermocouples comprising:

sputter deposited thin film p-type thermoelements having thicknesses of 0.1 mm or greater;

sputter deposited thin film n-type thermoelements alternatingly positioned adjacent the p-type thermoelements, the n-type thermoelements having a thickness of about 0.1 mm or greater;

wherein the thermoelectric power source has a volume of less than about 10 cm^3 and has a power output of from about 1 μW to about 1 W generated by the thermocouples on the single flexible substrate; and

wherein the p-type thermoelements or the n-type thermoelements comprise a Bi_xTe_y, Sb_xTe_y, or Bi_xSe_y alloy where x is about 2 and y is about 3.

24. (Previously presented) The thermoelectric device of claim 23 wherein said multiple thermocouples electrically connected to one another are in series-parallel.

25. (Currently Amended) The thermoelectric power source of claim 23 wherein the p-type thermoelements have L/A ratios greater than about ~~20~~ 500 cm^{-1}.

Claims 26 – 36 (Canceled)

37. (Currently Amended) A thermoelectric power source comprising:

a flexible substrate having an upper surface; and

a thermoelectric couple comprising:

(a) ~~a sputter~~ co-sputter deposited alternating thin film p-type and n-type thermoelements positioned on the upper surface of the flexible substrate;

~~(b) a sputter deposited thin film n-type thermoelement positioned on the upper surface of the flexible substrate adjacent the p-type thermoelement; and~~

(be) an electrically conductive member positioned on the flexible substrate, and electrically connecting ~~the~~ a first end of the p-type thermoelement with ~~the~~ a second end of the n-type thermoelement, wherein the p-type or the n-type thermoelements comprise Bi_xTe_y where x is about 2 and y is about 3; and

(cd) wherein the flexible substrate is in a coil configuration.

38. (Previously presented) The thermoelectric power source of claim 37 wherein the p-type thermoelements or the n-type thermoelements are at least about 1 mm in length and at least about 0.1 mm in width.

39. (Previously presented) The thermoelectric power source of claim 37 wherein the volume of the thermoelectric power source is less than about 10 cm^3 and has a power output of from about 1μW to about 1W.